Indian Ocean from altimetry and OGCM

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The LODYC Ocean General Circulation Model is run over the Indian Ocean north of 40°S with all closed boundary conditions. At the surface it is forced by the Hellerman and Rosenstein stress field and the Ober-Uber air-sea fluxes. Temperature and salinity are restaured to Levitus as a function of latitude, depth and distance to the coast so that there is no influence of Levitus in the equatorial region, nor in the upper layers, nor in the vicinity of the boundaries.

Topex-Poseidon and a revisited Geosat data set are used to validate the simulated sea-level variations. Three estimates are derived from the simulations. One corresponds to the dynamic height relative to 450m level, the second is relative to 2000m and the third is derived from the surface pressure gradient simulated at the rigid lid. It is shown that even "in the equatorial region, there is a significant difference between the first two estimates and the third one. The difference between the third estimate and the dynamic topography relative to 2000m can be as big as 5cm. This difference does not only correspond to barotropic signal. It is due to the fact that the vertical integration of the density field in a model with rigid lid cannot provide the sea-level signal. The signal derived from the surface pressure at the rigid lid is the signal which corresponds to the quantity observed by altimetry relative to its mean value over the model domain.

Then, OGCM is used to validate the two components of the sea-level gradient derived from Topex-Poseidon and Geosat. OGCM performs much better than shallow-water simulations forced by the same winds.